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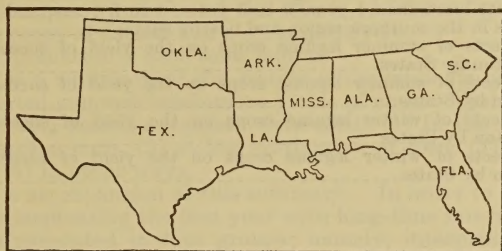
No. 3

SOUTHERN REGION AGRICULTURAL CONSERVATION

August 1937

SUMMARY OF EFFECTS OF LEGUMES
ON YIELDS OF COTTON AND CORN
IN THE SOUTHERN REGION
AND NEARBY STATES

Information Contained Herein is Supplementary to that
Set Forth in SRAC-1, "Effects of Summer Soil-Conserving
Crops on Yields of Other Crops" and SRAC-2,
"Effects of Winter Soil-Conserving Crops."



Issued in the interest of Agricultural Conservation by the Agricultural
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SUMMARY OF EFFECTS OF LEGUMES ON YIELDS OF COTTON AND CORN IN THE SOUTHERN REGION AND NEARBY STATES

Since the publication of the two bulletins entitled "Effects of Summer Soil-Conserving Crops on Yields of Other Crops", Southern Region Agricultural Conservation No. 1, and "Effects of Winter Soil-Conserving Crops", Southern Region Agricultural Conservation No. 2, by the Southern Division of the Agricultural Adjustment Administration, there have been many requests for a summary of the findings of the experiments compiled in each of these publications.

In order to arrive at some conclusive evidence as to whether or not it pays to interplant a summer legume crop with corn, or whether or not it pays to grow a summer or winter legume crop in rotation with a cash crop of cotton or corn, summaries of experiments applicable to such problems are offered. It is believed that these summaries will be useful to agricultural workers.

There are two condensed summaries: One on the effects of interplanted summer legumes on the yield of corn, and the other on the effects of summer legumes and the effects of winter legumes on the succeeding crops of cotton and corn respectively.

A brief explanation of each table follows:

Table 1 is a summary of the results of experiments on the effects of interplanted summer legumes on yields of corn. Various methods of interplanting summer legumes were used: (1) In the same row at time of planting corn, (2) at last cultivation of corn, (3) in alternate rows, and (4) in other ways.

Table 3 is an expansion of this summary. In order to compare the effects of interplanting the first year with long-time interplanting, the results are presented in four groups; namely, interplanting (1) the first year; (2) 2 to 3 years continuously on the same land; (3) 4 to 8 years continuously on the same land; and (4) more than 8 years continuously on the same land.

In the first group (1-year interplanting), it is assumed that there is a direct competition between corn and legumes, since no legumes were turned under to aid in the increased yield of corn. This section consists of all applicable 1-year experiments, as well as the first year's results of other experiments which were conducted for 2 or more years. (In the latter instance, the first year's results are also presented in the last three groupings; thus, the results of each experiment are given in its entirety.)

Table 2 summarizes in brief the yields of cotton and corn, following either a summer or a winter crop of legumes, compared with yields of cotton and corn not preceded by legumes. The crops of both summer and winter legumes were used in various ways, sometimes for hay, sometimes for seed; in many cases only the stubble was turned under and in other cases the vines were turned under.

The part of the table dealing with the effects of summer legumes on the yield of cotton is expanded in table 4; the part dealing with the effects of summer legumes on the yield of corn is expanded in table 5.

The parts of table 2 dealing with the effects of winter legumes on the yields of cotton and corn are expanded in tables 6 and 7, respectively. These tables show the results of experiments comparing the yields of cotton and corn grown continuously on the same land with the yields of cotton and corn, respectively, following a crop of winter legumes.

The condensed summaries (table 1 and table 2) are shown in expanded forms for the convenience of persons who may be interested in summarizing the results of experiments in any particular State. Suppose, for instance, that one were interested in using the data in the first section of table 3, in order to arrive at a conclusion regarding the effects of interplanted legumes on the yield of corn in Arkansas. The weighted average yield of corn without legumes is arrived at by dividing the total of column 4 (232.2 bushels) by the total of column 3 (8 crop-acres). The result is 29.2 bushels, which is the weighted average yield of corn without legumes. The weighted average yield of corn, when interplanted with legumes, is arrived at by dividing the total of column 6 (606.7) by the total of column 5 (18 crop-acres). The result is 33.7 bushels, which is the weighted average yield of corn when interplanted with legumes.

While these summaries show the effects of legumes on cotton and corn only, other summaries showing the effects of legumes on other soil-depleting crops may be made. For example, in both Southern Region Agricultural Conservation No. 1 and Southern Region Agricultural Conservation No. 2 there are results of experiments showing the effects of legumes on crops other than cotton and corn.

TABLE 1.—*Summary: Effects of interplanted summer legumes on the yield of corn in the southern region and nearby States for specified periods*¹

Duration of tests 1	Corn				
	Planted alone		Interplanted with legumes		
	Crop-acres ²	Yield per acre	Crop-acres ²	Yield per acre	Percentage difference in yield
	2	3	4	5	6
	Number	Bushels	Number	Bushels	Percent
1 year ³	47	33.9	82	29.1	-14.2
2 to 3 years ⁴	17	31.8	43	28.5	-10.4
4 to 8 years ⁴	21	31.7	29	31.6	-.3
Over 8 years ⁴	64	24.6	64	28.3	+15.0

¹ Taken from tables 54, 63-68, 70-78 of Southern Region Agricultural Conservation No. 1.

² Since all experiments in Southern Region Agricultural Conservation No. 1 are worked out on an acre basis columns 2 and 4 represent the number of crops on an acre basis. The number of crops was arrived at by the number of years the tests were conducted.

³ Not more than 1 year on the same land.

⁴ Continuously on the same land.

TABLE 2.—*Effects of previous crops of summer or winter legumes on the yields of seed cotton and corn in the southern region and nearby States*

SEED COTTON					
Preceding crop	Without legumes		With legumes		
	Crop-acre ¹	Yield per acre	Crop-acre ¹	Yield per acre	Percentage difference in yield
1	2	3	4	5	6
Summer legumes ²	<i>Number</i>	<i>Pounds</i>	<i>Number</i>	<i>Pounds</i>	<i>Percent</i>
Winter legumes ³	50	756	62	1,163	+53.9
	106	808	247	1,276	+58.0
CORN					
	<i>Number</i>	<i>Bushels</i>	<i>Number</i>	<i>Bushels</i>	<i>Percent</i>
Summer legumes ⁴	51	25	103	36	+42.8
Winter legumes ⁵	53	25	175	35	+41.2

¹ Since all experiments in Southern Region Agricultural Conservation No. 1 and in Southern Region Agricultural Conservation No. 2 are worked out on an acre basis, columns 2 and 4 represent the number of crops on an acre basis. The number of crops was arrived at by the number of years the tests were conducted.

² Taken from tables specified in table 4.

³ Taken from tables specified in table 6.

⁴ Taken from tables specified in table 5.

⁵ Taken from tables specified in table 7.

TABLE 3.—*Effects of interplanted legumes on the yield of corn, shown by periods of not more than 1 year, 2 to 3 years, 4 to 8 years, and more than 8 years in the southern region and nearby States*

NOT MORE THAN 1 YEAR ON SAME LAND					
Table no. and State ¹	Date of experiment	Total yield of corn—			
		Without legumes		With legumes	
		Crop-acres ²	Yield per acre ²	Crop-acres ²	Yield per acre ³
1	2	3	4	5	6
64, Arkansas	1920	<i>Number</i>	<i>Bushels</i>	<i>Number</i>	<i>Bushels</i>
	1920	1	60.0	1	48.7
	1920			1	64.5
	1920			1	55.3
	1920			1	58.7
	1920			1	52.9
	1922	1	43.7	1	32.4
	1922			1	38.6
	1922			1	41.1
	1922			1	41.2
65, Arkansas	1922			1	42.6
	1922	1	40.4	1	29.0
	1923	1	24.7	1	22.6
	1899	1	24.8	1	23.7
66, Arkansas	1899	1	23.1	1	22.4
	1901	1	8.4	1	8.8
	1901	1	9.1	1	8.0
	1901			1	8.4
	1901			1	7.8
	1916-18, 1934-35	5	132.5	5	76.5
	1932	1	52.6	1	29.3
67, Georgia	1929	1	41.9	1	28.0
68, Louisiana	1928-33	6	112.2	6	81.6
70, Louisiana	1928	1	39.6	1	30.5
71, Mississippi	1928			1	40.2

See footnotes at end of table.

TABLE 3.—*Effects of interplanted legumes on the yield of corn, shown by periods of not more than 1 year, 2 to 3 years, 4 to 8 years, and more than 8 years in the southern region and nearby States—Continued*

NOT MORE THAN 1 YEAR ON SAME LAND—Continued

Table no. and State ¹	Date of experiment	Total yield of corn—			
		Without legumes		With legumes	
		Crop- acres ²	Yield per acre ³	Crop- acres ²	Yield per acre ³
1	2	3	4	5	6
72, Mississippi	1919	Number	Bushels	Number	Bushels
	1919	1	39.2	1	35.6
	1919			1	39.2
	1919			1	32.1
	1919			1	36.7
	1921	1	13.6	1	19.6
	1921			1	15.7
	1921			1	10.7
	1923	1	48.2	1	45.5
	1923			1	42.5
	1923			1	31.3
	1923			1	40.2
	1926	1	57.9	1	51.5
	1926			1	43.1
	1926			1	38.5
	1926			1	46.5
	1927	1	46.1	1	43.4
	1927			1	28.0
	1927			1	33.0
	1928	1	42.7	1	24.3
	1928			1	38.1
	1929	1	55.3	1	36.8
	1929			1	48.8
	1929			1	40.8
73, Mississippi	1921-24	4	96.8	4	70.8
	1921-24			4	90.0
	1921-24			4	62.8
75, South Carolina	1931	1	60.3	1	60.5
76, Tennessee	1915-17, 1919-21	5	260.5	5	170.5
76, Tennessee	1906, 1907, 1909, 1915	4	157.6	4	108.4
77, Tennessee	1910	1	38.4	1	39.4
77, Tennessee	1910	1	34.4	1	34.9
78, Texas	1913	1	17.1	1	20.3
78, Texas	1916	1	12.6	1	13.0
Total of all States		47	1,593.7	82	2,385.4
Average yield per acre ³			33.9		29.1
Difference in average yield					-4.8
Percentage difference					Percent -14.2

2 TO 3 YEARS CONTINUOUSLY ON THE SAME LAND⁴

64, Arkansas	1922-23	2	60.8	2	39.2
	1922-23			2	53.6
	1922-23			2	62.0
	1922-23			2	66.2
	1922-23			2	58.8
65, Arkansas	1922-24	3	91.2	3	67.5
	1923-24	2	43.6	2	39.6
72, Mississippi	1923-25	3	147.0	3	109.5
	1923-25			3	114.6
	1923-25			3	99.6
	1923-25			3	111.9
74, South Carolina	1930-32	3	78.0	3	82.8
	1930-32			3	77.7
	1930-32			3	75.0
76, Tennessee	1921-22	2	90.6	2	79.8
78, Texas	1913-14	2	29.6	2	52.4
				2	34.4
Total of all States		17	540.8	43	1,224.6
Average yield per acre ³			31.8		28.5
Difference in average yield					-3.3
Percentage difference					Percent -10.4

See footnotes at end of table.

TABLE 3.—*Effects of interplanted legumes on the yield of corn, shown by periods of not more than 1 year, 2 to 3 years, 4 to 8 years, and more than 8 years in the southern region and nearby States—Continued*

4 TO 8 YEARS CONTINUOUSLY ON THE SAME LAND ⁴

Table no. and State ¹	Date of experiment	Total yield of corn—			
		Without legumes		With legumes	
		Crop-acres ²	Yield per acre ³	Crop-acres ²	Yield per acre ³
1	2	3	4	5	6
		<i>Number</i>	<i>Bushels</i>	<i>Number</i>	<i>Bushels</i>
54, Louisiana.....	1932-35.....	4	122.4	4	125.6
68, Louisiana.....	1929-33.....	5	153.5	5	149.5
71, Mississippi.....	1928-35.....	8	200.0	8	211.2
	1928-35.....			8	245.6
75, South Carolina.....	1931-34.....	4	189.6	4	184.4
Total of all States.....		21	665.5	29	916.3
Average yield per acre ³			31.7		31.6
Difference in average yield.....					— .1
Percentage difference.....					Percent — .3

MORE THAN 8 YEARS CONTINUOUSLY ON SAME LAND ⁴

63, Alabama.....	1896-1905.....	10	171.0	10	192.0
	1906-15.....	10	102.0	10	162.0
	1920-29.....	10	82.0	10	194.0
77, Tennessee.....	1910-26.....	17	742.9	17	765.0
	1910-26.....	17	479.4	17	499.8
Total of all States.....		64	1,577.3	64	1,812.8
Average yield per acre ³			24.6		28.3
Difference in average yield.....					+3.7
Percentage difference.....					Percent +15.0

¹ These are the numbers of the tables, together with the States where experiments were conducted as given in the experiments represented in Southern Region Agricultural Conservation No. 1, "Effect of Summer Soil-Conserving Crops on Other Crops."

² Since all experiments in Southern Region Agricultural Conservation No. 1 are worked out on an acre basis for each crop, 1 crop per year, each figure in columns 3 and 5 shows not only the number of crop-acres, as indicated in the heading, but also the number of years during which the experiment was conducted. There are naturally fewer acres on check plots (column 3) than on interplanted plots (column 5), since interplanted plots carry various legumes and spacings.

³ Total yields in columns 4 and 6 were arrived at by multiplying the number of acres (columns 3 and 5) by their respective average yields per acre, as obtained from tables used in this summary. Average yields per acre not included in this table.

⁴ First year results are included.

⁵ Total yield of all crops divided by aggregate number of acres used in the experiments equals weighted average yield without legumes and with legumes, respectively.

TABLE 4.—*Effects of summer legume crops on the yield of succeeding crops of cotton by States* ¹

ALABAMA

Table no. ² 1	Date of experiment 2	Total yield of seed cotton—			
		Without legumes		With legumes	
		Crop-acres ³ 3	Yield per acre ⁴ 4	Crop-acres ³ 5	Yield per acre ⁴ 6
		Number	Pounds	Number	Pounds
1.....	1911.....	1	1,303	1	1,890
1.....	1911.....			1	1,910
1.....	1914.....	1	979	1	962
1.....	1914.....			1	1,008
46.....	1899.....	1	837	1	1,533
46.....	1899.....			1	1,373
48.....	1899.....	1	918	1	1,126
48.....	1899.....			1	1,578
50 ⁵	1903-7.....	5	3,390	5	3,920
51.....	1889.....	1	1,080	1	1,365
51.....	1889.....			1	1,392

ARKANSAS

2.....	1892.....	1	1,008	1	1,291
2.....	1892.....			1	1,409
4.....	1891.....	1	700	1	950
4.....	1893.....	1	419	1	753

LOUISIANA

54.....	1932-35.....	4	3,660	4	4,824
54.....	1932-35.....	4	4,580	4	5,204
70.....	1929, 1931, 1933.....	3	2,907	3	3,504

MISSISSIPPI

55.....	1903-13.....	11	7,909	11	9,482
55.....	1903-13.....	11	2,035	11	5,203
73.....	1924-26.....	3	5,475	3	6,762
73.....	1924-26.....			3	6,642
73.....	1924-26.....			3	7,071

SOUTH CAROLINA

6.....	1935.....	1	583	1	939
Total of all States.....		50	37,783	62	72,091
Average yield per acre ⁶			755.7		1,162.8
Difference in acreage yield.....					+407.1
Percentage difference.....					Percent +53.9

¹ This table is an expansion of table 2 of this summary with reference to the effects of summer legumes on succeeding crops of cotton.

² Southern Region Agricultural Conservation No. 1.

³ See footnote 2 in table 3.

⁴ See footnote 3 in table 3.

⁵ Converted from lint cotton to seed cotton.

⁶ Total yield of all crops divided by aggregate number of crop-acres used in the experiments equals weighted average yield without legumes and with legumes, respectively.

TABLE 5.—*Effects of summer legume crops on the yield of succeeding crops of corn by States*¹

ALABAMA

Table no. ² 1	Date of experiment 2	Total yield of corn—			
		Without legumes		With legumes	
		Crop- acres ³ 3	Yield per acre ⁴ 4	Crop- acres ³ 5	Yield per acre ⁴ 6
8.....	1901.....	Number 1	Bushels 13.6	Number 1	Bushels 17.9
8.....	1901.....	1	13.6	1	25.9
50.....	1903-06.....	4	86.4	4	75.2
51.....	1889.....	1	27.7	1	27.3
51.....	1889.....	1	27.7	1	31.6

ARKANSAS

66.....	1900.....	1	18.4	1	20.9
66.....	1900.....	1	18.1	1	22.0
66.....	1902.....	1	24.4	1	31.9
66.....	1902.....	1	26.1	1	33.6
66.....	1902.....	1	26.1	1	37.4
66.....	1902.....	1	26.1	1	39.2

FLORIDA

53.....	1925-27.....	3	26.1	3	36.0
53.....	1925-27.....	3	26.1	3	50.4
53.....	1925-27.....	3	26.1	3	42.6
53.....	1925-27.....	3	26.1	3	49.8

LOUISIANA

13.....	1930.....	1	19.6	1	24.1
13.....	1930.....	1	19.6	1	30.5
13.....	1932.....	1	19.1	1	33.3
13.....	1932.....	1	19.1	1	50.2

MISSOURI

58.....	1906.....	1	34.0	1	63.0
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TENNESSEE

15.....	1905-24, even years.....	10	299.0	10	340.0
15.....	do.....	10	299.0	10	424.0
15.....	do.....	10	299.0	10	405.0
16.....	1922, 1923, 1925, 1926, 1929.....	5	155.0	5	241.5
17.....	1906-17.....	5	155.0	5	208.5
17.....	1909, 1911, 1913, 1914, 1916.....	5	155.0	5	239.5
17.....	1909, 1911, 1913, 1914, 1916.....	5	124.5	5	170.0
17.....	1909, 1911, 1913, 1914, 1916.....	5	124.5	5	184.5
18.....	1912, 1916, 1920.....	3	102.0	3	186.0

VIRGINIA

62.....	1914-20.....	7	124.6	7	247.1
62.....	1914-20.....	7	124.6	7	284.2
Total of all States.....		51	1, 273.6	103	3, 673.1
Average yield per acre ⁴			25.0		35.7
Difference in average yield.....					+12.7
Percentage difference.....					Percent +42.8

¹ This table is an expansion of table 2 of this summary with reference to the effects of summer legumes on succeeding crops of corn.

² Southern Region Agricultural Conservation No. 1.

³ See footnote 2 in table 3.

⁴ See footnote 3 in table 3.

⁵ Total yield of all crops divided by aggregate number of crop-acres in the experiments equals weighted average yield without legumes and with legumes, respectively.

TABLE 6.—*Effects of winter legumes on the yield of succeeding crops of cotton by States*¹

ALABAMA

Table no. ²	Date of experiment	Total yield of seed cotton—			
		Without legumes		With legumes	
		Crop-acres ³	Yield per acre ⁴	Crop-acres ³	Yield per acre ⁴
1	2	3	4	5	6
		<i>Number</i>	<i>Pounds</i>	<i>Number</i>	<i>Pounds</i>
1.....	1896-1905.....	10	8,030	10	8,130
1.....	1906-15.....	10	5,730	10	6,750
1.....	1920-29.....	10	3,490	10	7,560
1.....	1930-35.....	6	3,330	6	7,374
2.....	1925-29.....	5	1,300	5	3,640
28.....	1925-29.....	5	1,865	5	4,830

GEORGIA

4.....	1926-34.....	9	6,732	9	11,844
4.....	1926-34.....			9	10,854
4.....	1926-34.....			9	10,512
4.....	1926-34.....	9	8,919	9	11,754
4.....	1926-34.....			9	13,068
4.....	1926-34.....			9	12,555
5.....	1928-34.....	7	6,636	7	7,889
5.....	1928-34.....	7	7,959	7	7,532

LOUISIANA

6.....	1931-35.....	5	4,230	5	5,600
6.....	1931-35.....			5	5,495
6.....	1931-35.....			5	5,175
6.....	1931-35.....			5	5,060
6.....	1931-35.....			5	5,660
6.....	1931-35.....			5	5,460
6.....	1931-35.....			5	5,605
7.....	1930-35.....	6	6,228	6	10,902
7.....	1930-35.....			6	11,796
7.....	1930-35.....			6	11,886
7.....	1930-35.....			6	11,634
7.....	1930-35.....			6	10,560
8.....	1931-33.....	3	3,456	3	5,355
8.....	1931-33.....			2	5,307

MISSISSIPPI

9.....	1929-34.....	6	5,076	6	6,960
9.....	1929-34.....			6	6,156
9.....	1929-34.....			6	5,580
9.....	1929-34.....			6	5,172
9.....	1929-34.....			6	5,556

SOUTH CAROLINA

12.....	1929-32.....	4	6,020	4	6,416
12.....	1929-32.....			4	6,940
12.....	1929-32.....			4	7,112
12.....	1929-32.....			4	6,708
12.....	1929-32.....	4	6,616	4	6,952
12.....	1929-32.....			4	7,316
12.....	1929-32.....			4	7,436
12.....	1929-32.....			4	7,160
Total of all States.....		106	85,617	247	315,281
Average yield per acre ⁴			807.7		1,276.4
Difference in average yield.....					+468.7
Percentage difference.....					Percent +58.0

¹ This table is an expansion of table 2 of this summary with reference to the effects of winter legumes on succeeding crops of cotton.² Southern Region Agricultural Conservation No. 2.³ See footnote 2 in table 3.⁴ See footnote 3 in table 3.⁵ Total yield of all crops divided by aggregate number of crop-acres in the experiments equals weighted average yield without legumes and with legumes, respectively.

TABLE 7.—*Effects of winter legume crops on the yield of succeeding crops of corn by States*¹

ALABAMA

Table number ²	Date of experiment	Total yield of corn—			
		Without legumes		With legumes	
		Crop-acres ³	Yield per acre ⁴	Crop-acres ³	Yield per acre ⁴
1	2	3	4	5	6
		<i>Number</i>	<i>Bushels</i>	<i>Number</i>	<i>Bushels</i>
29.....	1925-29.....	5	35.5	5	113.0
29.....	1925-29.....	5	44.5	5	98.0

GEORGIA

14.....	1926-34.....	9	314.1	9	488.7
14.....	1926-34.....			9	434.7
14.....	1926-34.....			9	423.9
14.....	1926-34.....	9	335.7	9	456.3
14.....	1926-34.....			9	468.0
14.....	1926-34.....			9	457.2
30.....	1931-33.....	3	86.7	3	120.9
30.....	1931-33.....			3	131.7
30.....	1931-33.....			3	132.6
30.....	1931-33.....			3	136.8
30.....	1931-33.....			3	131.4
30.....	1931-33.....			3	109.2
30.....	1931-33.....			3	107.1
30.....	1931-33.....			3	88.5
30.....	1931-33.....			3	120.3

LOUISIANA

15.....	1931-35.....	5	73.5	5	118.0
15.....	1931-35.....			5	102.5
15.....	1931-35.....			5	93.0
15.....	1931-35.....			5	101.5
15.....	1931-35.....			5	91.0
15.....	1931-35.....			5	103.5
15.....	1931-35.....	5	74.5	5	119.0
15.....	1931-35.....			5	116.5
15.....	1931-35.....			5	92.0
15.....	1931-35.....			5	109.5
15.....	1931-35.....			5	99.0
15.....	1931-35.....			5	103.5

MISSISSIPPI

16.....	1929-35.....	7	204.4	7	260.4
16.....	1929-35.....			7	222.6

TENNESSEE

18.....	1908-12.....	5	154.0	5	209.0
18.....	1908-12.....			5	217.0
Total of all States.....		53	1,322.9	175	6,176.3
Average yield per acre ⁵			25.0		35.3
Difference in average yield.....					+10.3
Percentage difference.....					Percent +41.2

¹ This is an expansion of table 2 of this summary with reference to the effects of winter legumes on succeeding crops of corn.

² Southern Region Agricultural Conservation No. 2.

³ See footnote 2 in table 3.

⁴ See footnote 3 in table 3.

⁵ Total yield of all crops divided by aggregate number of crop-acres in the experiments equals weighted average yield without legumes and with legumes, respectively.

Southern Division of the Agricultural Adjustment Administration, U. S. Department of Agriculture: Effects of Summer Soil-Conserving Crops on Yields of Other Crops, U. S. Department of Agriculture, AAA Southern Region Agricultural Conservation No. 1 (SRAC-1), 64 pp., 1936. Effects of Winter Soil-Conserving Crops, U. S. Department of Agriculture, AAA Southern Region Agricultural Conservation No. 2 (SRAC-2), 54 pp., 1936.

